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## RESPONSE TO QUERY ON PLUTONIUM INJECTION STUDY - MANHATTAN DISTRICT

The Atomic Energy Commission is conducting a staff inquiry into a biological experiment undertaken by the Manhattan Engineer District near the end of World War II to determine how plutonium, a man-made radioactive material, is deposited and excreted in the human body.

At that time, thousands of workers in the defense industry were involved in handling plutonium and it was essential to establish realistic criteria for protecting their health. For this purpose, accurate information was needed about the retention of this material in the human body and about its rate of excretion. A great deal had already been learned from experiments in animals, but it was recognized that reliable information pertaining to man could be obtained only from persons who had received small but known amounts of plutonium.

Between 1945 and 1947, 18 hospital patients were injected with small amounts of soluble plutonium. No adverse effects resulting from the injections were observed at any time. All but one of the injections were given before the AEC was established in August 1946. The subjects selected for the study generally were over 45 years old and suffered from chronic or malignant diseases that made survival for 10 years highly unlikely. Nevertheless, four of these patients are still alive.

Scientific studies were conducted for about five years after the injections. Much of what is known today about the retention of plutonium in man is based on these experiments. In 1972, Dr. Patricia W. Durbin of Lawrence Berkeley Laboratory, contributed a chapter to the book "Radiobiology of Plutonium", in which she reviewed the essential clinical information

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about the patients and presented a complete analysis of the data from this study.

Early in 1973, an investigator at an AEC contract facility arranged for clinical examinations and follow-up studies for three of the surviving patients. In addition, he obtained permission later in 1973 for the exhumation of the body of one patient in order to determine the distribution of plutonium. A series of papers describing the results of these recent studies will be presented at the International Congress for Radiation Research to be held in Seattle, Washington, in July 1974.

The inquiry now being conducted by AEC staff at the request of the five-member Commission, seeks to establish the circumstances under which this study was done, including whether any of the 18 patients or their next of kin were informed about the nature and purpose of the injections. Because of the strict secrecy surrounding plutonium at that time, it is uncertain what the patients may have been told. Furthermore, policy guidelines for the conduct of medical experimentation on humans and the concept of informed consent were then not yet clearly formulated.

It has been established, as a result of the present inquiry, that one surviving patient was informed and consented to receive the injection, but it was not possible to determine whether or not this practice had been observed with the other survivors also. It is the intent of the AEC to insure that they or their next of kin will be informed through their personal physicians.

Of the 18 patients who participated in this study, 13 were male and 5 female; 15 were white and 3 black; 13 were 45 years old or older at the time of injection, 2 were between 35 and 45, 2 were between 18 and 35, and 1 was 4 years old. Four patients are alive today; the fate of 2 is

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unknown; all the others died of their diagnosed illnesses, 7 within a year after injection, 3 within 1 to 10 years, and 2 within 25 years.

The findings of the AEC staff inquiry will be made available to the public.

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